Commonwealth of Kentucky
Division for Air Quality

PERMIT STATEMENT OF BASIS

Title V draft permit No. V-00-010 (Revision 1)
MARTEK BIOSCIENCES CORPORATION
WINCHESTER, KY
OCTOBER 20, 2003
REVIEWER: ALI IMAM AND CAROLINA ALONSO
Plant I.D. # 021-049-00032
Application Log # G102
Revision 1 Application Log #s 54317 & 55762

REVISION 1. DESCRIPTION OF CONSTRUCTION:

Application Log Number 54317 is for the installation of the following:
EP 207 Boiler #4, Fermentation boiler;
Three (3) Production Fermentation tanks, 200,000 liters, each; and
Four (4) Seed tanks:

- 1-40,000 liters
- 1-4,000 liters
- 1-400 liters
- 1-40 liters.

Application Log Number 55762 is for the construction of Winchester Plant # 2. It will include the same processes at their existing facility with the exception of extraction. There is excess extraction capacity at Winchester Plant # 1.

REVISION 1. COMMENTS:

REVISION 1, Emission factors and their source:

EP 201 Media Preparing – Brine Tank: A mass balance was performed by the permittee to determine an emission factor for particulate matter.
EP 202 Media Preparing – Blending: A mass balance was performed by the permittee to determine an emission factor for particulate matter.
EP 203 Culture Growing & Fermenting: A mass balance was performed by the permittee to determine an emission factor for particulate matter.
EP 204 Dryer Exhaust: A mass balance was performed by the permittee to determine an emission factor for particulate matter.
EP 205 Biomass Conveying & Filling: A mass balance was performed by the permittee to determine an emission factor for particulate matter.
EP 206 Vegetable Oil Bleaching: A mass balance was performed by the permittee to determine an emission factor for particulate matter.
EP 207 Vegetable Oil Bleaching: A mass balance was performed by the permittee to determine an emission factor for VOC (Hexane) and VOC (Light Oils).

EP 208 Vegetable Oil Deodorizing: A mass balance was performed by the permittee to determine an emission factor for VOC (Light Oils).
EP 209 Production of Nutritional Oil: A mass balance was performed by the permittee to determine an emission factor for fugitives.
EP 210-211 Boilers: Natural gas boiler emissions were calculated according to AP-42, Section 1.4.
EP 212 High Pressure Steam Generator: Natural gas boiler emissions were calculated according to AP-42, Section 1.4.
EP 213 Dryer Heater: Natural gas boiler emissions were calculated according to AP-42, Section 1.4.
EP 214 Ammonium Hydroxide Tank: A mass balance was performed by the permittee to determine an emission factor for VOC (Ammonia).
EP 215 Base Tanks: A mass balance was performed by the permittee to determine an emission factor for VOC (Ammonia).

REVISION 1, Applicable regulations:

401 KAR 59:010, New Process Operations
401 KAR 59:010, New process operations, applies to the particulate matter emissions from units constructed on or after July 2, 1975, which are not subject to another emissions standard with respect to particulates in 401 KAR Chapter 59. This includes the following emissions points:
EP 201 Media Preparing – Brine Tank;
EP 202 Media Preparing – Blending;
EP 203 Culture Growing & Fermenting;
EP 204 Dryer Exhaust;
EP 205 Biomass conveying & Filling;
EP 206 Vegetable Oil Bleaching; and
EP 209 Production of Nutritional Oil.

401 KAR 59:015, New Indirect Heat Exchangers
401 KAR 59:015, New indirect heat exchangers, applies to the following emission points:
EP 107 Boiler #4, Fermentation Boiler;
EP 210-211 Boilers 1 & 2;
EP 212 High Pressure Steam Generator; and
EP 213 Dryer Heater.

401 KAR 59:015, New indirect heat exchangers, applies to the particulate emissions and sulfur dioxide emissions of indirect heat exchangers with a capacity of greater than one million BTU per hour that were commenced on or after April 9, 1972 (for indirect heat exchangers with a capacity of 250 million BTU per hour heat input or less).

40 CFR Part 60, Subpart Dc
401 KAR 60:005 incorporating by reference 40 CFR Part 60 Standards of performance for new stationary sources, Subpart Dc is applicable to EP 107 Boiler #4, Fermentation Boiler and EP 210-211 Boilers 1 & 2.

401 KAR 60:005 incorporating by reference 40 CFR Part 60, Standards of performance for new stationary sources applies to each steam generating unit for which construction, modification, or reconstruction is commenced after June 9, 1989 and that has a maximum design heat input capacity of

29 megawatts (MW) (100 million Btu per hour (Btu/hr)) or less, but greater than or equal to 2.9 MW (10 million Btu/hr).

401 KAR 63:020, Potentially Hazardous Matter or Toxic Substances
401 KAR 63:020, Potentially hazardous matter or toxic substances, applies to each affected facility which emits or may emit potentially hazardous matter or toxic substances, provided such emissions are not elsewhere subject to the provisions of the administrative regulations of the Division for Air Quality. 401 KAR 63:020, Potentially hazardous matter or toxic substances, applies to the following emission points:
EP 106 Oil Extraction Process;
EP 207 Vegetable Oil Bleaching;
EP 214 Ammonium Hydroxide Tank; and
EP 215 Base Tanks.

401 KAR 50:012, General application
401 KAR 50:012, General application, applies to all major air contaminant sources for which a standard is not specified in Kentucky's Air Quality Administrative Regulations. 401 KAR 50:012, General application, applies to the following emission points:
EP 106 Oil Extraction Process and
EP 207 Vegetable Oil Bleaching.

REVISION 1, Regulations Not Applicable:

40 CFR 63, Subpart CCCC, National Emission Standards for Hazardous Air Pollutants: Manufacturing of Nutritional Yeast, will not apply since marine algae is processed not yeast.

REVISION 1, Additional comments:
Boiler allowables were corrected as detailed in the calculations for this permit revision.

REVISION 1. RESPONSE TO COMMENTS:

The public notice on the availability of the draft permit for comments by persons affected by the plant was published in *The Winchester Sun* in Winchester, Kentucky, on September 11, 2003. The public comment period expired 30 days from the date of publication. A public hearing was held on October 14, 2003. During this time, no comments were received from the company or the public.

ORIGINAL ISSUANCE of V-00-010
REVIEWER: JOHN LEWIS
Application Log # G102

SOURCE DESCRIPTION:

The Martek Biosciences facility in Winchester produces two single cell oils, each of which is enriched in a specific fatty acid. One is a triglyceride oil enriched in DHA (docosahexaenoic acid) derived from a marine microalgae (DHASCO®) and the second is a triglyceride oil enriched in ARA (arachidonic acid) derived from a common soil organism (ARASCO®). The process begins when a biomass is produced through cultivation of a starter seed culture, particular to the oil to be produced, in a series of increasingly larger fermentors. After the final fermentation, in the case of the marine algae, the biomass is spray dried. The ARASCO® biomass must be dried through other means at a toll processing facility. The oil is extracted from the dried biomass using a hexane extraction process. The oil is winterized, refined, bleached, and deodorized to produce the final product.

COMMENTS:

Emission factors and their source:

EP 01-03 & 07 Boilers: Natural gas boiler emissions were calculated according to AP-42, Section 1.4.
EP 04 Spray dryer: Emission calculations are based on the results of particulate emissions tests performed on January 7, 2000. Emissions for the combustion of natural gas were calculated according to AP-42, Section 1.4
EP 05 Pilot spray dryer: A mass balance was performed by the permittee to determine an emission factor for particulate matter. Emissions for the combustion of natural gas were calculated according to AP-42, Section 1.4
EP 06 Oil extraction process: Emissions were calculated based on information provided by Martek showing commercial hexane losses per month and days of operation for the period September 1998 through August 1999. The PTE was calculated from the month (June) that had the highest hexane loss per day of operation.

Applicable regulations:

Regulation 401 KAR 59:010, New Process Operations, applies to the particulate matter emissions from units constructed on or after July 2, 1975, which are not subject to another emissions standard with respect to particulates in 401 KAR Chapter 59. This includes the following emissions points:
04 Spray Dryer: Emissions of particulate shall not exceed 3.59 lb/hr and the opacity shall not equal or exceed 20 percent.
05 Pilot spray dryer: Emissions of particulate shall not exceed 2.34 lb/hr and the opacity shall not equal or exceed 20 percent.
Regulation 401 KAR 59:015, New indirect heat exchangers, applies to the particulate emissions and sulfur dioxide emissions of indirect heat exchangers with a capacity of greater than one million BTU per hour that were commenced on or after April 9, 1972 (for indirect heat exchangers with a capacity of 250 million BTU per hour heat input or less). This includes the following emissions points:
01-03 Boilers: Emissions of particulate shall not exceed 0.451 lb/MMBTU actual heat input and opacity shall not exceed 20 percent. Emissions of sulfur dioxide shall not exceed 2.06 lb/MMBTU actual heat input.

Compliance demonstration:

EP 01-03 Boilers: No compliance demonstration is required. The potential to emit of sulfur dioxide and particulate from these natural gas boilers is less than 10% of their respective allowable emission rates.
EP 04 Spray dryer: No compliance demonstration is required. The potential to emit is considerably less than the allowable.
EP 05 Pilot spray dryer: No compliance demonstration is required. The potential to emit for particulate is less than 15% of the allowable emission rate.
EP 06 Oil extraction process: There are no allowable emission rates for the oil extraction process.

Additional comments:

The spray dryer (04) and pilot spray dryer (05) both have a cyclone associated with them. The spray dryer (04) also has a small baghouse. These cyclones and the baghouse are used for product collection, thus the division considers them to be part of the process equipment and not a control device. Neither dryer can function properly without these devices.

PERIODIC MONITORING:

EP 01-03 Boilers: The permittee shall monitor the monthly usage of natural gas in order to calculate yearly emissions.
EP 04 Spray dryer: The permittee shall monitor natural gas usage and the amount of biomass entering the spray dryer in order to calculate yearly emissions.
EP 05 Pilot spray dryer: The permittee shall monitor natural gas usage and the amount of biomass entering the pilot spray dryer in order to calculate yearly emissions.
EP 06 Oil extraction process: The permittee shall record hexane purchases in order to calculate yearly emissions.

CREDIBLE EVIDENCE:

This permit contains provisions which require that specific test methods, monitoring or recordkeeping be used as a demonstration of compliance with permit limits. On February 24, 1997, the U.S. EPA promulgated revisions to the following federal regulations: 40 CFR Part 51, Sec. 51.212; 40 CFR Part 52, Sec. 52.12; 40 CFR Part 52, Sec. 52.30; 40 CFR Part 60, Sec. 60.11 and 40 CFR Part 61, Sec. 61.12, that allow the use of credible evidence to establish compliance with applicable requirements. At the issuance of this permit, Kentucky has not incorporated these provisions in its air quality regulations.